Basic Atomic Structure Worksheet

1. The 3 particles of the atom are:
   a. **electrons**
   b. **protons**
   c. **neutrons**

   Their respective charges are:
   a. **negative**
   b. **positive**
   c. **none**

2. The number of protons in one atom of an element determines the atom’s **identity**, and the number of electrons determines the **reactivity** of the element.

3. The atomic number tells you the number of **protons** in one atom of an element. It also tells you the number of **electrons** in a neutral atom of that element. The atomic number gives the “identity” of an element as well as its location on the periodic table. No two different elements will have the **same** atomic number.

4. The **average atomic mass** of an element is the average mass of an element’s naturally occurring atom, or isotopes, taking into account the **mass** of each isotope.

5. The **mass number** of an element is the total number of protons and neutrons in the **nucleus** of the atom.

6. The mass number is used to calculate the number of **neutrons** in one atom of an element. In order to calculate the number of neutrons you must subtract the **protons** from the **mass number**.

7. Give the symbol of and the number of protons in one atom of:

   - Lithium: **Li** 3
   - Iron: **Fe** 26
   - Oxygen: **O** 8
   - Krypton: **Kr** 36
   - Bromine: **Br** 35
   - Copper: **Cu** 29
   - Mercury: **Hg** 80
   - Helium: **He** 2

8. Give the symbol of and the number of electrons in a neutral atom of:

   - Uranium: **U** 92
   - Boron: **B** 5
   - Chlorine: **Cl** 17
   - Iodine: **I** 53
   - Xenon: **Xe** 54

9. Give the symbol of and the number of neutrons in one atom of:

   (Mass numbers are ALWAYS whole numbers...show your calculations)

   - Barium: **Ba** 81
   - Carbon: **C** 6
   - Fluorine: **F** 10
   - Europium: **Eu** 89
   - Bismuth: **Bi** 126
   - Hydrogen: **H** 0
   - Magnesium: **Mg** 12
   - Mercury: **Hg** 121
10. Name the element which has the following numbers of particles:
   a. 26 electrons, 29 neutrons, 26 protons __Fe__ (iron)
   b. 53 protons, 74 neutrons __I__ (iodine)
   c. 2 electrons (neutral atoms) __He__ (helium)
   d. 20 protons __Ca__ (calcium)
   e. 86 electrons, 125 neutrons, 82 protons __Po__ (lead)
   f. 0 neutrons __H__ (hydrogen)

11. If you know ONLY the following information can you ALWAYS determine what the element is? (Yes/No)
   a. Number of protons __Yes__
   b. Number of neutrons __No__
   c. Number of electrons in a neutral atom __Yes__
   d. Number of electrons __No__

12. Fill in the missing items in the table below.

<table>
<thead>
<tr>
<th>NAME</th>
<th>SYMBOL</th>
<th>Z</th>
<th>A</th>
<th># PROTONS</th>
<th># ELECTRONS</th>
<th># NEUTRONS</th>
<th>ISOTOPIC SYMBOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Sodium</td>
<td>Na</td>
<td>11</td>
<td>23</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>²³¹¹Na</td>
</tr>
<tr>
<td>b. Chlorine</td>
<td>Cl</td>
<td>17</td>
<td>35</td>
<td>17</td>
<td>17</td>
<td>18</td>
<td>³⁵¹⁷Cl</td>
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<tr>
<td>c. Potassium</td>
<td>K</td>
<td>19</td>
<td>39</td>
<td>19</td>
<td>19</td>
<td>20</td>
<td>³⁹¹⁹K</td>
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<tr>
<td>d. Phosphorus</td>
<td>P</td>
<td>15</td>
<td>31</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>³¹¹⁵P</td>
</tr>
<tr>
<td>e. Iron</td>
<td>Fe</td>
<td>26</td>
<td>56</td>
<td>26</td>
<td>26</td>
<td>30</td>
<td>⁵⁶²⁶Fe</td>
</tr>
<tr>
<td>f. Iodine</td>
<td>I</td>
<td>53</td>
<td>127</td>
<td>53</td>
<td>53</td>
<td>74</td>
<td>¹²⁷⁵³I</td>
</tr>
<tr>
<td>g. Silver</td>
<td>Ag</td>
<td>47</td>
<td>108</td>
<td>47</td>
<td>47</td>
<td>61</td>
<td>¹⁰⁸⁴⁷Ag</td>
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<tr>
<td>h. Krypton</td>
<td>Kr</td>
<td>36</td>
<td>84</td>
<td>36</td>
<td>36</td>
<td>48</td>
<td>⁸⁴³⁶Kr</td>
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<tr>
<td>i. Tungsten</td>
<td>W</td>
<td>74</td>
<td>184</td>
<td>74</td>
<td>74</td>
<td>110</td>
<td>¹⁸⁴⁷⁴W</td>
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<tr>
<td>j. Copper</td>
<td>Cu</td>
<td>29</td>
<td>64</td>
<td>29</td>
<td>29</td>
<td>35</td>
<td>⁶⁴²⁹⁰Cu</td>
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<tr>
<td>k. Indium</td>
<td>In</td>
<td>49</td>
<td>115</td>
<td>49</td>
<td>49</td>
<td>66</td>
<td>¹¹⁵⁵⁹In</td>
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<tr>
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<td>79</td>
<td>197</td>
<td>79</td>
<td>79</td>
<td>118</td>
<td>¹⁹⁷⁷⁹Au</td>
</tr>
<tr>
<td>m. Sulfur</td>
<td>S</td>
<td>16</td>
<td>32</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>³²¹⁶S</td>
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</tbody>
</table>